

SH&G

November 21, 1983
13155

Central Intelligence Agency
New Building Project Office
Room 4E50
CIA Headquarters Building
Washington, DC 20505

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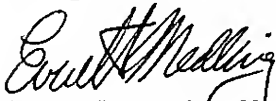
Attention:

Re: Chiller Technical Specification
Log 299

Gentlemen:

Enclosed for your review, as we discussed today, is an updated copy of the chiller technical specification.

Very truly yours,



Wm. Everett Medling, AIA
Project Manager

WEM:clm
Enclosure

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SM&G 13133
CENTRAL INTELLIGENCE AGENCY
HEADQUARTERS EXPANSION
BIO PACKAGE 3SC
SUPPLY CONTRACT - CHILLERS

SECTION 15600
DATE 11/15/83

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CHILLERS

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- 1) 1. CONDENSER WATER PUMPS
- 2) GENERAL
- 3) FURNISH A TOTAL OF SEVEN (7) CONDENSER WATER PUMPS.
- 4) PUMPS SHALL HAVE THE CAPACITIES AND CHARACTERISTICS AS HEREINAFTER SPECIFIED.
- 6) PUMP NAMEPLATES SHALL CONTAIN THE GPM AND HEAD AT THE SELECTION POINT.
- 7) SINCE PUMP NAMEPLATE IS TO BE COVERED BY FIXED INSULATION, THE GPM AND
- 8) HEAD AT THE SELECTION POINT SHALL ALSO BE INCLUDED IN THE MOTOR
- 9) NAMEPLATE DATA.
- 10) FURNISH CERTIFIED PUMP CHARACTERISTIC CURVES WITH THE PUMPS SHOWING
- 11) CAPACITIES, HEADS, EFFICIENCIES AND BRAKE HORSEPOWER THROUGHOUT THE
- 12) ENTIRE RANGE OF THE PUMPS WHEN OPERATING SINGLY AND THRU THE RANGE OF
- 13) THE ENTIRE SEVEN PUMPS OPERATING IN PARALLEL.
- 14) PUMPS SHALL BE SELECTED TO PERFORM THE SPECIFIC DUTY FOR WHICH THEY
- 15) ARE INTENDED.
- 16) THE RATIO OF THE MAXIMUM PUMP IMPELLER DIAMETER TO THE SELECTED PUMP
- 17) IMPELLER DIAMETER SHALL BE 1.15 OR GREATER.
- 18) PUMPS SHALL BE CHECKED FOR LUBRICATION, ALIGNMENT AND OPERATING
- 19) CONDITIONS BY A FACTORY REPRESENTATIVE AFTER PUMPS HAVE BEEN SET,
- 20) LEVELLED, GROUTED, CONNECTED TO PIPING, AND SYSTEM FILLED READY TO
- 21) OPERATE.
- 22) PUMPS SHALL BE SELECTED TO OPERATE WITHIN TWO PERCENTAGE POINTS OF
- 23) MAXIMUM EFFICIENCY ON THE IMPELLER CURVE SELECTED AND HAVE A MAXIMUM
- 24) SUCTION VELOCITY OF EIGHT FEET PER SECOND.
- 25) NO POINT ON THE HEAD-CAPACITY CURVE SHALL EXCEED THE MOTOR HORSEPOWER
- 26) SELECTED TO DRIVE THE PUMP.
- 27) MOTOR HORSEPOWER AT THE SELECTION POINT SHALL NOT EXCEED 95 PERCENT OF
- 28) THE RATED MOTOR HORSEPOWER.
- 29) PUMPS SHALL BE DOUBLE SUCTION SPLIT CASE TYPE, MOTOR DRIVEN THRU A
- 30) FLEXIBLE COUPLING, MOUNTED ON A COMMON ENCLOSED CAST IRON OR STEEL
- 31) BASE SUITABLE FOR AND WITH ADEQUATE PROVISIONS FOR GROUTING.
- 32) PUMP CASINGS SHALL BE CLOSE GRAINED CAST IRON SUITABLE FOR 175 LB.
- 33) WORKING PRESSURE WITH 125 LB. ANSI FLANGES.
- 34) THE PUMP VOLUTE SHALL BE SUPPLIED WITH PLUGGED VENT, DRAIN AND GAGE
- 35) TAPPINGS.
- 36) PUMP SHAFTS SHALL BE OF STAINLESS STEEL.
- 37) BEARINGS SHALL BE REGREASABLE BALL TYPE.
- 38) IMPELLERS SHALL BE BRONZE, ENCLOSED DOUBLE SUCTION TYPE, KEYED TO
- 39) SHAFT AND DYNAMICALLY BALANCED FOR QUIET OPERATION.
- 40) PUMPS SHALL BE EQUIPPED WITH PACKED STUFFING BOX CONSTRUCTION WITH A
- 41) MINIMUM OF 4 RINGS OF PACKING PLUS AN EXTERNALLY SUPPLIED FLUSH RING
- 42) PUMPS SHALL BE EQUIPPED WITH
- 43) SUITABLE DRAIN PAN WITH TAPPED CONNECTION AND PIPING TO DRAIN

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44) PUMPS SHALL EACH HAVE A CAPACITY OF 4450 GPM AT A TOTAL DYNAMIC HEAD
45) OF 125 FEET WHEN DRIVEN AT 1750 RPM BY A 200 MAXIMUM HORSEPOWER MOTOR.
46) PUMPS WILL HAVE A TOTAL 14 NPSH AVAILABLE.

47) PUMPS SHALL BE INGERSOLL-RAND WORTHINGTON; BUFFALO FORGE; AURORA;
48) PEERLESS; WEINMAN, OR AS APPROVED.

49) MOTORS

50) MOTORS SHALL CONFORM TO THE FOLLOWING STANDARDS AND REQUIREMENTS:

51) "AMERICAN STANDARDS FOR ROTATING ELECTRICAL MACHINERY, C50",
52) AMERICAN NATIONAL STANDARDS INSTITUTE.

53) "AMERICAN STANDARD TERMINAL MARKINGS FOR ELECTRICAL APPARATUS
54) C6.1" AMERICAN NATIONAL STANDARDS INSTITUTE.

55) "NEMA STANDARDS FOR MOTORS AND GENERATORS", LATEST EDITION.

56) "AMERICAN STANDARD DEFINITIONS OF ELECTRICAL TERMS", AMERICAN
57) NATIONAL STANDARDS INSTITUTE.

58) THE MOTOR HORSEPOWER RATINGS SPECIFIED, SCHEDULED, OR SHOWN SHALL BE
59) UNDERSTOOD TO BE THE MINIMUM ACCEPTABLE AND THE INDICATED MOTOR SPEEDS
60) THE MAXIMUM ACCEPTABLE.

61) MOTORS SHALL BE SUITABLE FOR OPERATION ON 4160 VOLT, 3 PHASE, 60 HERTZ
62) ELECTRICAL SERVICE.

63) MOTORS SHALL BE NEMA RATED "U" FRAME. "T" FRAME MOTORS ARE NOT
64) ACCEPTABLE.

65) MOTORS SHALL BE GENERAL PURPOSE, SQUIRREL CAGE INDUCTION TYPE, DESIGN
66) "B", ACROSS-THE-LINE FULL VOLTAGE STARTING WITH MAXIMUM SLIP OF 5
67) PERCENT AND LOCKED ROTOR AND BREAKDOWN TORQUES AS DEFINED IN NEMA.

68) MOTORS SHALL BE OPEN, DRIP-PROOF NEMA CLASS B INSULATION, RATED 1.15
69) SERVICE FACTOR.

70) SPEED CLASSIFICATION SHALL BE AS INDICATED OR REQUIRED FOR THE SERVICE
71) AND IN ACCORD WITH THE ESTABLISHED NEMA STANDARDS SECTIONS MG1-1.15
72) THROUGH MG1-1.20.

73) MOTORS SHALL OPERATE SUCCESSFULLY AT RATED LOAD WITH MAXIMUM VOLTAGE
74) VARIATION OF PLUS OR MINUS 10 PERCENT AT RATED FREQUENCY.

75) MOTORS SHALL BE SIZED SO THAT THEIR DESIGN LOADS SHALL NOT EXCEED 95
76) PERCENT OF THEIR RATED LOADS.

77) MOTORS SHALL HAVE CODE LETTERS FOR LOCKED ROTOR KVA PER HORSEPOWER AS
78) DEFINED IN ACCORD WITH NEMA SECTION MG1-2.14.

79) MOTORS SHALL HAVE NAMEPLATES ATTACHED THERETO THAT SHALL GIVE MINIMUM
80) INFORMATION AS DEFINED IN NEMA SECTION MG1-2.15. WHENEVER THE MOTOR
81) NAMEPLATE IS NOT VISIBLE, A PLATE WITH DUPLICATE INFORMATION SHALL BE
82) PROVIDED WHERE IT CAN BE READILY SEEN. NAMEPLATES SHALL NOT BE REMOVED
83) FROM MOTOR.

84) MOTOR ACCESSORIES SHALL INCLUDE:

85) GREASE LUBRICATED BALL TYPE BEARINGS.

86) TYPE OF MOUNTING AS REQUIRED WITH STANDARD DIMENSIONS IN ACCORD
87) WITH NEMA SECTION MG1-PART 3.

88) JUNCTION BOX OF ADEQUATE SIZE TO TERMINATE THE INDICATED CONDUIT
89) AND WIRE. SPECIAL BOX EXTENSIONS SHALL BE PROVIDED IF NECESSARY.
90) JUNCTION BOX SHALL HAVE A SEPARATE LUG FOR GROUND CONNECTION.

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- 4 91) SOLDERLESS CONNECTORS USED ON ALL MOTOR LEADS.
- 3 92) MOTOR COMPARTMENTS SHALL BE CLEAN AND DRY AND ADEQUATELY VENTED
93) DIRECTLY TO THE EXTERIOR.
- 3 94) MOTORS SHALL BE AS MANUFACTURED BY DELCO; LIMA; REULAND; GENERAL
95) ELECTRIC; ELECTRIC APPARATUS; OR AS APPROVED.
- 3 96) A LOAD TEST SHALL BE CONDUCTED ON ALL MOTORS AND THE CURRENT READINGS
97) TAKEN. UNDER NO CONDITION SHALL THE LOAD CURRENT EXCEED THE NAMEPLATE
98) RATING OF THE MOTOR. IF THIS CONDITION EXISTS, THE CONTRACTING OFFICER
99) SHALL BE NOTIFIED IMMEDIATELY.
- 1 100) 2. CENTRAL LIQUID CHILLER REFRIGERATION MACHINES
- 2 101) FURNISH FIVE (5) CENTRIFUGAL LIQUID CHILLER UNITS, WITH SPECIFIED
102) ACCESSORIES; CHILLER MANUFACTURER'S SHALL BE: YORK, CARRIER OR TRANE.
- 2 103) FOR OPERATING ECONOMY, THE CHILLERS SHALL BE CAPABLE OF STARTING AND
104) OPERATING AT PART LOAD WITH THE ENTERING CONDENSER WATER TEMPERATURE AT
105) LEAST AS LOW AS 55 DEG. F.
- 2 106) CHILLER PERFORMANCE SHALL BE RATED IN ACCORDANCE WITH THE AIR
107) CONDITIONING AND REFRIGERATION INSTITUTE (ARI) STANDARD 550, LATEST
108) EDITION.
- 2 109) EACH UNIT SHALL BE A COMPLETE FACTORY PACKAGE INCLUDING A CENTRIFUGAL
110) COMPRESSOR, OPEN OR HERMETIC MOTOR, COMPRESSOR MOTOR STARTER, COOLER,
111) CONDENSER AND PURGE OR PUMPOUT UNIT. UNIT SHALL BE FACTORY ASSEMBLED,
112) PIPED, WIRED AND LEAK TESTED. IF THE MANUFACTURER DOES NOT PROVIDE A UNIT
113) AS A COMPLETE FACTORY PACKAGE, THE INSTALLING CONTRACTOR WILL FURNISH THE
114) NECESSARY LABOR AND MATERIAL TO COMPLETE THE ASSEMBLY WITH THE
115) SUPERVISION OF THE MANUFACTURER'S REPRESENTATIVE. MANUFACTURER OF CHILLER
116) SHALL HAVE A FACTORY MAINTAINED SERVICE ORGANIZATION AND REPAIR PARTS
117) STOCK WITHIN THE AREA.
- 2 118) EVAPORATOR AND CONDENSER SHALL BE OF SHELL AND TUBE TYPE DESIGN IN
119) ACCORDANCE WITH REQUIREMENTS OF THE ASME CODE FOR UNFIRED PRESSURE
120) VESSELS. REFRIGERANT SIDE SHALL BE PROOF-TESTED PER APPLICABLE CODE OR AT
121) 1.5 TIMES MAXIMUM DESIGN WORKING PRESSURE BUT NOT LESS THAN 45 PSIG. A
122) SAFETY RUPTURE DISC IN ACCORDANCE WITH ANSI/ASHRAE 15-1978 SAFETY CODE
123) SHALL BE PROVIDED FOR THE REFRIGERANT CIRCUIT.
- 2 124) EACH TUBE SHALL BE INTEGRAL, EXTERNALLY FINNED, 3/4-INCH NOMINAL
125) DIAMETER, .045 INCH WALL THICKNESS, SEAMLESS COPPER WITH SMOOTH LANDS AT
126) ALL TUBE SUPPORTS. TUBES SHALL BE INDIVIDUALLY REPLACEABLE WITH TUBE ENDS
127) ROLLED INTO ANNULAR GROOVES IN THE TUBE SHEETS. EACH EVAPORATOR TUBE
128) SHALL BE ROLLED INTO THE INTERMEDIATE SUPPORT SHEETS.
- 2 129) WATER BOXES SHALL BE DESIGNED FOR 150 PSIG MAXIMUM WORKING PRESSURE.
130) WATER SIDE SHALL BE HYDROSTATICALLY TESTED AT 1.5 TIMES WORKING PRESSURE.
131) WATER BOXES SHALL BE OF THE MARINE STYLE, WITH COVERS REMOVABLE WITHOUT
132) DISTURBING PIPING. CONDENSER AND CHILLED WATER BOX COVERS SHALL ALSO BE
133) HINGED. TAPS FOR VENTS AND DRAINS SHALL BE PROVIDED.
- 2 134) EVAPORATOR SHALL HAVE ELIMINATORS INSTALLED ALONG ITS COMPLETE LENGTH
135) ABOVE THE TUBES TO PREVENT LIQUID REFRIGERANT FROM ENTERING THE
136) COMPRESSOR.
- 2 137) LIQUID REFRIGERANT ENTERING EVAPORATOR SHALL BE DISTRIBUTED UNIFROMLY THE
138) ENTIRE LENGTH OF SHELL AND WITHOUT DIRECT IMPINGEMENT OF HIGH VELOCITY
139) REFRIGERANT ON TUBES.
- 2 140) FOR STANDARD WATER SELECTIONS, MINIMUM ALLOWABLE REFRIGERANT TEMPERATURE
141) SHALL BE 34 F. AT THE DESIGN CONDITIONS HEREINAFTER SPECIFIED.

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- 2 142) RELIEF DEVICES SHALL BE PROVIDED FOR THE REFRIGERANT SIDE, IN ACCORDANCE
143) WITH ANSI B9.1 SAFETY CODE AND LOCAL CODE. MULTIPLE RELIEF DEVICES SHALL
144) BE BROUGHT TO A COMMON VENT CONNECTION.
- 2 145) COMPRESSOR SHALL BE OF THE CENTRIFUGAL TYPE, DIRECT OR GEAR DRIVEN AT A
146) MAXIMUM SPEED OF 7000 RPM.
- 2 147) COMPRESSOR IMPELLERS SHALL BE HIGH STRENGTH ALUMINUM ALLOY, BALANCED BOTH
148) STATICALLY AND DYNAMICALLY. IMPELLER SHALL BE PROOF-TESTED AT LEAST 15
149) PERCENT ABOVE DESIGN OPERATING SPEED.
- 2 150) COMPRESSOR ASSEMBLY SHALL BE RUN-TESTED AT THE FACTORY. VIBRATION SHALL
151) NOT EXCEED 1.0 MIL AT THE COMPRESSOR HOUSING.
- 2 152) CAPACITY CONTROL SHALL BE BY VARIABLE INLET GUIDE VANES, CAPABLE OF
153) MODULATING PERFORMANCE FROM 10 PERCENT TO 100 PERCENT RATED UNIT CAPACITY
154) AT DESIGN CONDITIONS. MINIMUM CAPACITY OF 10 PERCENT SHALL BE ATTAINED
155) WITHOUT SURGING OR ADJUSTING REFRIGERANT CHARGE. AUTOMATIC HOT GAS
156) BYPASS, IF REQUIRED, SHALL BE PROVIDED TO ALLOW OPERATION AT 10 PERCENT
157) LOAD. MINIMUM CONDENSER WATER TEMPERATURE IS TO BE 55 DEGREES F.
- 2 158) MOTOR SHALL BE 2-POLE, CONTINUOUS DUTY, SQUIRREL CAGE INDUCTION TYPE, AND
159) SHALL HAVE AN OPEN DRIP-PROOF OR HERMETIC DESIGN ENCLOSURE. MOTOR
160) FULL-LOAD AMPERES (FLA) AT DESIGN CONDITIONS SHALL NOT EXCEED MOTOR
161) NAMEPLATE FLA. MOTOR SHALL BE FACTORY MOUNTED AND ALIGNED WITH THE
162) COMPRESSOR. MOTOR SHALL BE DESIGNED FOR USE WITH THE TYPE STARTER
163) SPECIFIED.
- 2 164) A POSITIVE DISPLACEMENT SUBMERGED OIL PUMP SHALL PROVIDE LUBRICATION TO
165) ALL PARTS REQUIRING OIL. PROVISIONS SHALL BE INCLUDED FOR CONTROLLED
166) HEATING OF OIL. HEATER SHALL BE SELECTED TO MAINTAIN OIL AT 150 DEGREES
167) F. DURING SHUT-DOWN TO MINIMIZE AFFINITY FOR REFRIGERANT. THE OIL PUMP
168) SHALL BE SUITABLE FOR OPERATION ON 120-VOLT SINGLE PHASE POWER. THIS
169) POWER SHALL BE SUPPLIED THROUGH THE CONTROL POWER TRANSFORMER.
- 2 170) THE UNIT MANUFACTURER SHALL PROVIDE A FULLY AUTOMATIC, FACTORY INSTALLED
171) OIL RETURN SYSTEM TO REMOVE THE OIL FROM THE LIQUID REFRIGERANT DURING
172) CHILLER OPERATION. THE OIL RETURN SYSTEM SHALL CONTINUOUSLY MAINTAIN THE
173) PROPER OIL LEVEL IN THE COMPRESSOR OIL SUMP AND PREVENT THE COLLECTION OF
174) OIL IN THE EVAPORATOR.
- 2 175) A REFRIGERANT OR WATER COOLED OIL COOLER SHALL BE PROVIDED. IF THE OIL
176) COOLER IS WATER COOLED THE INSTALLING CONTRACTOR WILL FURNISH AND INSTALL
177) NECESSARY AUXILIARY WATER PIPING, VALVES AND CONTROLS TO THE OIL COOLER.
178) COMPLETE LUBRICATION SYSTEM SHALL BE FACTORY INSTALLED AND PIPED.
- 2 179) METHOD OF SENSING HERMETIC MOTOR WINDING TEMPERATURE OF EACH PHASE SHALL
180) BE PROVIDED. THIS DEVICE SHALL INDEPENDENTLY STOP THE COMPRESSOR MOTOR IF
181) EXCESSIVE TEMPERATURE IS SENSED IN ANY OF THE THREE WINDINGS. A FULL SET
182) OF SPARE SENSORS SHALL BE PROVIDED WITH WIRING TO CONTROL PANEL. OPEN
183) DRIVE MOTOR PROTECTION SHALL BE PROVIDED BY MEANS OF CURRENT SENSING.
- 2 184) LOW VOLTAGE AND SINGLE-PHASE PROTECTION (PHASE FAILURE) SHALL BE
185) PROVIDED.
- 2 186) UNITS THAT OPERATE AT SUB-ATMOSPHERIC PRESSURE (R-11, R-113, R-114) SHALL
187) BE PROVIDED WITH A COMPLETE PURGE UNIT, PROVIDING POSITIVE MEANS FOR
188) COLLECTION, RETURN OF REFRIGERANT AND REMOVAL OF NON-CONDENSABLES. A
189) SIGNAL LIGHT ON THE CONTROL CENTER SHALL BE PROVIDED WHICH WILL ALERT THE
190) OPERATOR AT OCCURRENCE OF EXCESSIVE PURGING, INDICATING AN ABNORMAL AIR
191) LEAK INTO THE UNIT.
- 2 192) PURGE UNIT SHALL BE PROVIDED WITH THE FOLLOWING:
- 7 193) SIGHT GLASS OIL LEVEL INDICATOR.
- 7 194) ELECTRICALLY HEATED OIL SEPARATOR.

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- 7 195) SECTIONALIZED DRUM PERMITTING SEPARATION OF NONCONDENSABLE
196) GASES AND WATER FROM DISCHARGE OF COMPRESSOR PURGE.
- 7 197) MEANS FOR RETURNING REFRIGERANT TO EVAPORATOR AND FOR
198) DRAWING OFF NONCONDENSABLES.
- 7 199) SOLENOID VALVE TO AUTOMATICALLY ISOLATE PURGE SYSTEM
200) FROM CENTRIFUGAL MACHINE WHEN PURGE COMPRESSOR IS NOT
201) IN OPERATION.
- 7 202) WATER CONNECTIONS TO ALLOW OPERATION OF THE PURGE
203) SYSTEM WHEN CENTRIFUGAL MACHINE IS NOT IN OPERATION.
- 2 204) UNITS THAT OPERATE ABOVE 15 PSIG (R12, R-22, R-500) SHALL BE PROVIDED
205) WITH A SEPARATE COMPRESSOR OPERATED TRANSFER UNIT AND SEPARATE STORAGE
206) RECEIVER TO PERMIT REMOVAL AND ISOLATION OF THE FULL REFRIGERANT CHARGE
207) ALLOWING INTERNAL INSPECTION OF THE CONDENSER, EVAPORATOR AND CENTRIFUGAL
208) COMPRESSOR. THE STORAGE RECEIVER SHALL BE ASME CODE CONSTRUCTED AND
209) STAMPED, AND FURNISHED WITH ANSI B9.1 SAFETY CODE AND LOCAL CODE. PUMPOUT
210) SYSTEM SHALL BE SUPPLIED AND WARRANTED BY THE CENTRIFUGAL MACHINE
211) MANUFACTURER. IT SHALL BE PRE-PIPED AND PRE-WIRED COMPLETE WITH FUSED
212) DISCONNECT, STARTER AND CONTROLS HOUSED IN A NEMA 1 ENCLOSURE. EACH UNIT
213) SHALL HAVE ITS OWN COMPLETE PUMP-OUT SYSTEM. THE INSTALLING CONTRACTOR
214) WILL FURNISH AND INSTALL NECESSARY AUXILIARY WATER PIPING AND VALVES TO
215) TRANSFER UNIT CONDENSER.
- 2 216) EACH CHILLER SHALL BE EQUIPPED WITH AN ELECTRIC CONTROL PANEL AND INCLUDE
217) THE FOLLOWING.
- 3 218) THREE-PHASE ELECTRONIC CURRENT LIMITING WITH INDIVIDUAL CURRENT
219) TRANSFORMERS.
- 4 220) ELECTRONIC CURRENT LIMITER SHALL LIMIT THE MAXIMUM AMPERAGE DRAWN
221) BY THE COMPRESSOR MOTOR BY MONITORING ALL THREE PHASES OF SUPPLY
222) POWER. THE INLET GUIDE VANES SHALL MODULATE IN RESPONSE TO THE
223) MAXIMUM AMPERAGE DRAWN BY ANY ONE OF THE THREE PHASES.
- 4 224) CONTINUOUS VARIABLE POSITION DEMAND LIMITER SHALL PERMIT MANUAL
225) CONTROL OF POWER DEMAND AT ALL OPERATING POINTS FROM 40 TO 100
226) PERCENT OF FULL LOAD POWER.
- 3 227) CAPACITY CONTROL
- 4 228) SELF-CONTAINED ELECTRIC TEMPERATURE CONTROL SYSTEM, INCLUDING
229) TEMPERATURE SENSOR, VANE ACTUATOR AND INTEGRATED CIRCUIT SOLID
230) STATE CONTROLS.
- 4 231) PRECISE CONTROL OF DEADBAND RANGE SHALL BE FIELD ADJUSTABLE FROM
232) PLUS OR MINUS 1/4 DEG. F TO PLUS OR MINUS 1-1/2 DEG. F.
- 4 233) UNIT SHALL INCLUDE A MANUAL FOUR-POSITION (HOLD, LOAD, UNLOAD OR
234) AUTOMATIC) DIAGNOSTIC SWITCH FOR EASE OF MAINTENANCE.
- 4 235) INDIVIDUAL LIGHTS SHALL INDICATE WHEN MACHINE IS LOADING,
236) UNLOADING, OR IF AUTOMATIC CURRENT LIMITING IS OCCURRING.
- 4 237) LOW REFRIGERANT TEMPERATURE OVERRIDE TO AUTOMATICALLY CLOSE THE
238) GUIDE VANES AND STOP THE COMPRESSOR IF LOW REFRIGERANT TEMPERATURE
239) IS DETECTED.
- 4 240) A METHOD TO MAINTAIN CAPACITY INLET GUIDE VANES IN CLOSED POSITION
241) DURING COMPRESSOR START-UP.
- 4 242) ANTIRECYCLE TIMER TO ENSURE 30-MINUTE INTERVAL BETWEEN SUCCESSIVE
243) COMPRESSOR MOTOR STARTS.

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- 4 244) INDIVIDUAL, FRONT ADJUSTABLE GAUGES TO INDICATE CONDENSER,
245) EVAPORATOR, OIL AND PURGE DRUM PRESSURES. GAUGES SHALL BE ORIFICED
246) TO PREVENT EXCESSIVE SENSITIVITY AND MOVEMENT OF GAUGE INDICATORS.
- 4 247) TIMER TO PROVIDE OPERATION OF OIL PUMP DURING PRELUBE AND POST-LUBE
248) CYCLES.
- 4 249) SWITCH TO PERMIT MANUAL OR AUTOMATIC OPERATION OF THE PURGE SYSTEM.
- 4 250) SAFETY CONTROLS WIRED IN THE MAIN CONTROL POWER CIRCUIT TO THE
251) STARTER. LOW EVAPORATOR TEMPERATURE, HIGH CONDENSER PRESSURE, HIGH
252) MOTOR TEMPERATURE AND LOW OIL PRESSURE CONTROLS SHALL BE WIRED TO
253) INDEPENDENTLY STOP THE COMPRESSOR MOTOR. ADDITIONALLY, EACH OF
254) THESE CONTROLS SHALL BE WIRED THROUGH A FAULT TRIP INDICATOR TO
255) PROVIDE A DOUBLE BREAK OF ALL SAFETY LOCKOUT SYSTEMS. METHOD TO
256) PROVIDE FIRST-OUT INDICATION OF FAULT SHALL BE PROVIDED. MANUAL
257) RESET OF THE FAULT TRIP INDICATOR SHALL BE REQUIRED.
- 4 258) ONE ADDITIONAL NORMALLY CLOSED ALARM CONTACT (CONVERTIBLE TO
259) NORMALLY OPEN CONTACTS ON EACH FAULT TRIP INDICATOR) TO ALLOW
260) REMOTE ANNUNCIATION OF ANY OF THE FOLLOWING CONDITIONS: LOW
261) EVAPORATOR TEMPERATURE, HIGH CONDENSER PRESSURE, HIGH MOTOR
262) TEMPERATURE, LOW OIL PRESSURE AND ELECTRICAL OVERLOAD.
- 4 263) 120-VOLT POWER SUPPLIES INDIVIDUALLY FUSED AND INCLUDING: CONTROL
264) CIRCUIT, OIL PUMP SYSTEM CIRCUIT, OIL HEATER CIRCUIT AND PURGE
265) CIRCUIT.
- 4 266) FACTORY INSTALLED CONTROL PANEL LIGHTS TO INDICATE SEQUENTIAL
267) START-UP AND OPERATION OF THE CHILLER, INCLUDING: SAFETIES,
268) SATISFIED, COOLING REQUIRED, RESTART TIME ELAPSED, CHILLED WATER
269) PUMP, CONDENSER WATER PUMP, OIL PUMP AND SYSTEM. PROVIDE ELAPSED
270) TIME METER AND STARTS COUNTER.
- 4 271) CAPABILITY OF INTERFACING WITH TYPICAL BUILDING ENERGY MANAGEMENT
272) SYSTEMS (DIRECT CURRENT LOAD SHED SIGNALS) TO REDUCE TOTAL
273) ELECTRICAL DEMAND.
- 4 274) CAPACITY CONTROL MECHANISM WHICH PROVIDES UNLOADED START-UP.
- 2 275) EACH UNIT SHALL BE FACTORY ANTI-SWEAT INSULATED WITH FLEXIBLE CLOSED CELL
276) INSULATION. INSULATION SHALL BE APPLIED TO THE COOLER PORTION OF THE
277) SHELL AT MINIMUM THICKNESS 3/4 INCH. THE SAME TYPE INSULATION SHALL BE
278) APPLIED TO COMPRESSOR SUCTION PIPING AND OTHER REFRIGERANT PIPING AS
279) NECESSARY.
- 2 280) THE UNIT MANUFACTURER SHALL FURNISH THE COMPLETE INITIAL CHARGE OF
281) REFRIGERANT AND LUBRICATING OIL, CHILLED WATER AND CONDENSER WATER FLOW
282) SWITCHES, AND FOUR VIBRATION ISOLATION MOUNTS CONSISTING OF 5/8 INCH
283) STEEL MOUNTING PLATES WITH 1 INCH THICK NEOPRENE ISOLATION PADS.
- 2 284) REMOTE MOUNTED STARTERS
- 3 285) COMPRESSOR MOTOR STARTER SHALL BE SUPPLIED BY THE CENTRIFUGAL CHILLER
286) MANUFACTURER. STARTER SHALL BE A 5 KV PRIMARY REACTOR TYPE ENCLOSED IN
287) A FREE STANDING NEMA-1 ENCLOSURE.
- 3 288) THE STARTER PANEL DOOR SHALL BE HINGED AND SHALL BE CAPABLE OF BEING
289) PADLOCKED TO PREVENT ACCESS BY UNAUTHORIZED PERSONNEL.
- 3 290) THE AMBIENT TEMPERATURE INSIDE THE STARTER PANEL SHALL NOT EXCEED 155
291) DEG. F (67 DEG. C) WITH ALL COMPONENTS ENERGIZED AT RATED LOAD
292) CONDITIONS AND 104 DEG. F (40 DEG. C) AMBIENT OUTSIDE THE STARTER
293) PANEL. TEMPERATURE RISE OF COMPONENTS SHALL BE PER RELATED NEC, NEMA
294) AND UL CODES.

- 3 295) A PERMANENT NAMEPLATE SHALL BE PROVIDED AND MOUNTED ON THE STARTER
296) PANEL. IT SHALL IDENTIFY THE MANUFACTURER, SERIAL OR MODEL NUMBER
297) IDENTIFYING THE DATE OF MANUFACTURE AND COMPONENT REPLACEMENT PARTS
298) AND ALL CURRENT AND VOLTAGE RATINGS.
- 4 299) THE OVERLOAD SYSTEM SHALL BE COORDINATED WITH THE COMPRESSOR MOTOR
300) AND FACTORY SET AND LABELED WITH THE COMPRESSOR MOTOR RATED LOAD
301) AMPS (RLA), LOCKED ROTOR AMPS (LRA) AND OVERLOAD TRIP (OLT)
302) SETTINGS, AND SHALL PROVIDE:
- 5 303) EXCESSIVE LOCKED ROTOR CURRENT PROTECTION.
- 5 304) EXCESSIVE LOCKED ROTOR TIME PROTECTION.
- 5 305) CURRENT CONTROL OF TRANSITION FROM START TO RUN CONFIGURATION.
- 5 306) MAXIMUM CURRENT PROTECTION TO PREVENT THE COMPRESSOR MOTOR FROM
307) EXCEEDING ITS OLT SETTING.
- 5 308) PROTECTION OF EQUIPMENT AGAINST TRANSITION RESISTOR FAILURE.
- 5 309) A FAULT TRIP INDICATOR, "MOTOR OVERLOAD" SHALL BE LOCATED IN
310) THE DOOR OF THE STARTER PANEL ENCLOSURE. THIS FAULT INDICATOR
311) SHALL BE DISPLAYED IF ANY OF THE ABOVE CONDITIONS ARE SENSED AND
312) SHALL CAUSE THE MACHINE TO BE SHUT DOWN. THIS FAULT SHALL
313) REQUIRE MANUAL RESET. ELECTRONIC DIGITAL TIMING SHALL BE
314) PROVIDED BY THE OVERLOAD SYSTEM FOR REPEATABILITY AND ACCURACY.
315) A NORMALLY CLOSED ALARM CONTACT SHALL BE PROVIDED FOR REMOTE
316) ANNUNCIATION OF ANY OF THE ABOVE CONDITIONS.
- 4 317) THE THREE-PHASE OVERLOAD SYSTEM SHALL BE FIELD SET FOR PURPOSES OF
318) COORDINATION WITH OTHER ELECTRICAL PROTECTION DEVICES.
- 3 319) TO PREVENT THE INCREASINGLY COMMON RAPID RECLOSURE FEATURE OF UTILITY
320) POWER DISTRIBUTION SYSTEMS FROM ADVERSELY AFFECTING THE MECHANICAL AND
321) POWER DRIVE EQUIPMENT, DISTRIBUTION FAULT PROTECTION SHALL BE
322) PROVIDED.
- 4 323) THE DISTRIBUTION FAULT PROTECTION SHALL CONSIST OF THREE-PHASE
324) CURRENT SENSING AND MONITORING THE STATUS OF THE STARTER. IF A
325) DISTRIBUTION FAULT IS DETECTED, THE FAULT TRIP INDICATOR
326) "DISTRIBUTION FAULT" SHALL BE DISPLAYED AND MANUAL RESET SHALL BE
327) REQUIRED. DISTRIBUTION FAULTS OF 1-1/2 ELECTRICAL CYCLES DURATION
328) SHALL BE DETECTED AND THE COMPRESSOR MOTOR SHALL BE DISCONNECTED
329) WITHIN SIX ELECTRICAL CYCLES.
- 3 330) POWER SUPPLY TERMINALS SHALL BE IDENTIFIED BY PERMANENT MARKERS. THE
331) MAXIMUM TEMPERATURE OF TERMINALS SHALL NOT EXCEED 167 DEG. F (75 DEG.
332) C) WHEN THE EQUIPMENT IS TESTED IN ACCORDANCE WITH ITS RATING.
- 3 333) CONTACTORS SHALL BE FULLY RECOGNIZED FOR AIR CONDITIONING AND
334) REFRIGERATION (DEFINITE PURPOSE) USE. THEY SHALL BE RATED IN VOLTAGE,
335) CONTINUOUS RATED LOAD AMPERES (RLA) AND LOCKED ROTOR AMPERES (LRA).
336) THE RATING SHALL EQUAL TO OR GREATER THAN THE REQUIREMENTS SPECIFIED
337) ON THE COMPRESSOR MOTOR NAMEPLATE.
- 3 338) ALL WIRES, BUS BARS AND FITTINGS SHALL BE COPPER ONLY, EXCEPT THE
339) INTERNAL WIRE OF THE CONTROL TRANSFORMER WHICH MAY BE ALUMINUM IF
340) COPPER TERMINATION IS PROVIDED.
- 3 341) DISCONNECTING MEANS IN THE FORM OF A NON-LOAD BREAK, HIGH INTERRUPTING
342) CAPACITY, FUSED DISCONNECT SHALL BE PROVIDED.
- 3 343) A 120-VOLT SINGLE-PHASE POWER SUPPLY SHALL BE DEVELOPED WITHIN THE
344) THREE-PHASE COMPRESSOR MOTOR STARTER AND SHALL BE IN ACCORDANCE WITH
345) THE CHILLER MANUFACTURER'S SPECIFICATIONS.

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- 3 346) THE STARTER SHALL BE EQUIPPED WITH TWO "PILOT" RELAYS TO INITIATE
347) THE MAIN CENTRIFUGAL STARTER SEQUENCE. THESE RELAYS SHALL BE A
348) SELF-MONITORING SAFETY CIRCUIT WHICH SHALL INDICATE IMPROPER OPERATION
349) (SLOW OPERATION, WELDING OF CONTACTS, ETC.) AND SHALL CAUSE THE UNIT
350) TO BE SHUT DOWN AND A FAULT TRIP INDICATOR TO BE DISPLAYED. THE
351) "STARTER CIRCUIT FAULT" INDICATOR SHALL BE LOCATED IN THE DOOR OF
352) THE ENCLOSURE AND SHALL REQUIRE MANUFAL RESET.
- 3 353) A LOCKOUT TRANSITION SAFETY CIRCUIT SHALL BE PROVIDED TO PREVENT
354) DAMAGE FROM PROLONGED ENERGIZATION DUE TO MALFUNCTION OF THE
355) TRANSITION CONTACTOR. MALFUNCTION SHALL CAUSE THE MACHINE TO BE SHUT
356) DOWN AND THE "STARTER CIRCUIT FAULT" INDICATOR TO BE DISPLAYED.
- 3 357) THE THREE-PHASE OVERLOAD SYSTEM SHALL PROVIDE PROTECTION TO THE
358) COMPRESSOR MOTOR.
- 3 359) TERMINAL CONNECTION PADS SHALL BE PROVIDED TO WHICH CUSTOMER APPLIED
360) LUGS CAN BE ATTACHED. PROVIDE SUFFICIENT SPACE FOR STRESS CONE
361) TERMINATION.
- 3 362) PROVIDE THREE (3) AMMETERS CALIBRATED FOR INDICATING INRUSH CURRENT.
- 3 363) A GROUND FAULT SENSOR SHALL OPEN STARTER CONTACTS WHEN THE DIELECTRIC
364) RESISTANCE IS SIGNIFICANTLY REDUCED IN EITHER THE STARTER OR
365) COMPRESSOR MOTOR. INDICATION AND RESET SHALL BE LOCATED IN THE STARTER
366) DOOR.
- 2 367) CAPACITY
- 3 368) EACH OF THE FIVE UNITS SHALL HAVE A CAPACITY OF 1600 TONS OF
369) REFRIGERATION, DELIVERING 2400 GPM OF CHILLED WATER COOLED FROM 58 DEG
370) F. TO 42 DEG F. WHEN SUPPLIED WITH 4800 GPM OF CONDENSER WATER AT 85
371) DEG F. WITH A 10 DEG F. TEMPERATURE RISE.
- 3 372) WATER TUBE VELOCITY THRU THE CONDENSER AND THE CHILLER SHALL NOT
373) EXCEED 10 FPS.
- 3 374) CONDENSER AND CHILLER SIDE FOULING FACTORS SHALL BE .0005.
- 2 375) START-UP SERVICE
- 3 376) MANUFACTURER SHALL FURNISH A FACTORY-TRAINED SERVICE ENGINEER DURING
377) THE START-UP PERIOD OF EACH MACHINE. THE SERVICE ENGINEER SHALL
378) PERFORM LEAK TESTING, EVACUATION AND DEHYDRATION USING A HIGH VACUUM
379) PUMP FURNISHED BY THE MANUFACTURER, CHARGING THE UNIT, START-UP AND
380) INSTRUCTION OF GOVERNMENT'S PERSONNEL ON OPERATION AND MAINTENANCE.
381) START-UP SHALL BE PERFORMED BY THE MANUFACTURE'S SERVICE ENGINEER;
382) SUPERVISION OF CONTRACTOR PERSONNEL PERFORMING THE START-UP WORK, IS
383) NOT ACCEPTABLE. MANUFACTURER SHALL PROVIDE OPERATING INSTRUCTIONS AND
384) PARTS LIST. REFER TO SPECIAL CONDITIONS. THE COST OF THIS START-UP
385) SERVICE SHALL BE INCLUDED IN THE MANUFACTURER'S BID PRICE.
- 3 386) IT IS ANTICIPATED THAT THE START-UP SERVICE FOR TWO OF THE CHILLERS
387) WILL BE REGAINED IN EARLY 1985 AND FOR THE OTHER THREE CHILLERS IN
388) EARLY 1986.

***END OF SECTION